

## REMARKS

### 1. *Claim rejections under 35 U.S.C. § 103(a)*

The Examiner rejected claims 1-21 as allegedly being obvious over O'Brien, US 5,521,278 ("O'Brien") and Drysdale, US 5,236,560 ("Drysdale"). Applicants traverse this rejection.

According to MPEP 2142, to reach a proper determination of obviousness under 35 U.S.C. §103(a), the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "*as a whole*" would have been obvious at that time to that person (emphasis added). Knowledge of applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search and evaluate the "*subject matter as a whole*" of the invention (emphasis added). The tendency to resort to "hindsight" based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

Guidance in following the process of determining the obviousness of a claim has been provided by recent United States case law, specifically, *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007). In *KSR*, the Supreme Court indicated that, regardless of the particular rationale used, a finding of unpatentability under 35 U.S.C. § 103(a) requires an Examiner to show, among other findings, *both* (i) a finding that the person of ordinary skill in the

art had *an apparent reason* to combine known options or known elements *and* (ii), if an apparent reason exists, a finding that the person of ordinary skill in the art could have pursued a combination *with a reasonable expectation of success*.

The above discussion of *KSR* assumes the art of record teaches all the elements or options. As should be apparent, if cited art fails to teach at least one option or element, a claim reciting that option or element must be patentable over that art.

The person of ordinary skill in the art would fail to arrive at the present invention because O'Brien and Drysdale fail to teach at least one option or element of the present claims.

The present claims are directed to a process comprising, among other elements, feeding a *vapour* product stream from a depolymerization reactor to a *rectification* column allowing liquefying components to flow back into the reactor and establishing two fractions in the rectification column as recited by the claims. Neither O'Brien nor Drysdale, alone or in any combination, teach or suggest a rectification column allowing return flow of liquid condensing therein back into the reactor, or the two established fractions, much less the process as a whole comprising these elements.

The Examiner argued at pp. 2-3 of the Detailed Action that O'Brien teaches a functional equivalent to the rectification column mounted on the depolymerisation reactor of the present invention, namely, at col. 2, step E. The Examiner further argued that recycling reaction components back to a reactor is an obvious expedient. The Examiner's argument fails to render the present claims obvious, for at least one or more of the reasons set forth below.

First, whether or not a teaching of the prior art is a "functional equivalent" of an element of a claim is irrelevant for determining patentability under 35 U.S.C. § 103(a). To find obviousness under the statute and relevant case law, the person of ordinary skill in the art must

have *an apparent reason* to combine the alleged "functional equivalent" with other known options or elements, along with *a reasonable expectation of success*. The Examiner's use of the term "functional equivalent," in the absence of the other showings required under *KSR*, merely begs the question and fails to establish a *prima facie* case of obviousness.

In addition, the Examiner's alleged "functional equivalents" are nothing of the sort. For example, he argues column 2, step E, of O'Brien, which teaches condensation of a vaporous reaction mixture removed in step D from a cracking zone, is equivalent to the rectification column being mounted in relation to the depolymerization reactor (noting that the term "condensation" is equivalent to the term "liquefaction"). It is clear from O'Brien's Figures 1A-1B and the accompanying discussion at col. 11, line 27 to col. 13, line 28 that O'Brien's step E refers to activities performed in the condenser 1000 and the vacuum distillation column 1400 of Figure 1B. These activities occur far downstream of the cracking unit 900 of Figure 1A. This certainly cannot be considered equivalent to the liquefaction that takes place in the rectification column of the present claims, wherein the liquefying components are allowed to flow back into the depolymerisation reactor.

The Examiner further argues that column 3, step C of O'Brien corresponds to step (c) of present claim 1. First, Applicants point out that the Examiner selected steps from two different aspects of O'Brien's teachings. O'Brien's first aspect is discussed at col. 2, lines 25-67, and includes step E discussed above. O'Brien's second aspect is discussed at col. 3, lines 1-30, and includes the step C referred to in this paragraph. The Examiner's picking and choosing from the two different aspects of O'Brien, without any recognition of differences between the aspects that would complicate any actual combination of elements of the two aspects hypothetically

contemplated by the person of ordinary skill in the art, indicates a failure to establish a *prima facie* case of obviousness.

Further examination, though, reveals why the Examiner picked and chose from two different aspects of O'Brien. Above, he applied step E of O'Brien's first aspect as the alleged equivalent of liquefaction within the rectification column of the present claims, e.g., step (a) of claim 1. Here, he applied step C of O'Brien's second aspect as the alleged equivalent of condensing a vapor fraction, e.g., step (c) of claim 1. However, step E of O'Brien's first aspect and step C of O'Brien's second aspect *teach the same thing*. To make this point utterly clear, we present the two steps side-by-side:

O'Brien, Step E, first aspect, col. 2, lines 58-62	O'Brien, Step C, second aspect, col. 3, lines 17-23
Condensing the vaporous reaction mixture and fractionating the condensate therefrom whereby lactic acid, water and minor amounts of lactide are removed as vapor overhead, concentrated lactide is removed as a liquid side stream and the heavy ends are removed as molten liquid	Condensing the vaporous reaction mixture and fractionating the condensate therefrom whereby lactic acid, water and minor amounts of lactide are removed as vapor overhead, concentrated lactide is removed as a liquid side stream and the condensate heavy ends are removed as molten liquid

It is therefore utterly plain that the Examiner is attempting to argue one teaching of O'Brien--that of condensing a vaporous reaction mixture and fractionating the resulting condensate--is the equivalent of two different steps of the present invention (e.g., steps (a) and

(c) of claim 1). This is clearly improper, and the rejection should be withdrawn for at least this reason alone.

In fact, a correct reading of O'Brien reveals that both step E of the first aspect and step C of the second aspect are each equivalent to steps (c) and (d) of Claims 1, 5, and 6 of the present invention. Applicants have acknowledged that these downstream features are known in other contexts (see present application, paragraph bridging pages 8-9).

Moving onward, the Examiner recognizes that O'Brien fails to teach a process for the purification of lactide from a crude lactide vapour product stream being produced by depolymerisation of low molecular weight polylactic acid in a reactor, comprising use of a rectification column being mounted onto the reactor such that components from the vapour product stream liquefying within the column are allowed to flow back into the reactor. Applicants base this statement on the Examiner's comment at p. 3 of the Detailed Action that "recycling reaction components back to a reactor is an obvious expedient well-known to a person of ordinary skill in the distillation chemical arts."

The Examiner's statement quote directly above, however, fails to reflect the proper standard for determining obviousness established by both the MPEP and settled case law. To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. M.P.E.P. § 706.02(j); *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (CCPA 1974). The prior art must disclose each and every element of the claimed invention and any motivation to combine or modify the prior art must be based upon a suggestion in the prior art. *In re Lee*, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002). Conclusory statements regarding common knowledge and common sense are insufficient to support a finding of obviousness. *Id.* at 1434-35.

O'Brien's teachings regarding recycling are found at col. 12, lines 26 to col. 13, line 28.

O'Brien teaches recycling via a set of condensation, distillation, and hydrolysis or dehydration steps. O'Brien fails to teach or suggest recycling involving the elimination of any one or more of those steps, let alone using a rectification column mounted onto the reactor such that components from the vapour product stream liquefying within the column are allowed to flow back into the reactor.

Although the Examiner does not discuss Drysdale in the Detailed Action, it is clear from Applicant's prior discussion of Drysdale in their paper dated June 17, 2009 that Drysdale teaches a distillation column for the downstream purification of the lactide, and is equivalent to O'Brien's feature 1400. The discussion presented above about step E of O'Brien's first aspect thus also applies to Drysdale. Also, Drysdale does not teach or suggest mounting of a rectification column on a reactor such that components from a vapour product stream liquefying within the column are allowed to flow back into the reactor.

For at least one or more of the reasons set forth above, O'Brien and Drysdale fail to teach or suggest using a rectification column as recited by the present claims, let alone one allowing liquefying components to flow back into a reactor. Therefore, the present claims contain at least one option or element not taught or suggested by the cited art. As a result, the present claims are patentable under 35 U.S.C. § 103(a) over the cited art, and Applicants request this rejection of claims 1-21 be withdrawn.

2. *Conclusion*

Applicants submit all pending claims are in condition for allowance. The Examiner is invited to contact the undersigned patent agent at (713) 934-4065 with any questions, comments or suggestions relating to the referenced patent application.

Respectfully submitted,

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